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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,812	12/08/2003	Yu Chang Kim	40296-0041	9240
2633	7590	01/20/2006	EXAMINER	
ASAHI KASEI KOGYO K.K. 2-6 DOJIMAHAMA 1-CHOME KITA-KU, OSAKA-SHI OSAKA JAPAN, JAPAN			GURLEY, LYNNE ANN	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 01/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/728,812

Applicant(s)

KIM ET AL.

Examiner

Lynne A. Gurley

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

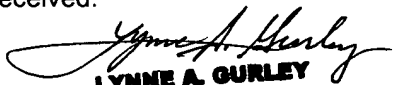
Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.


LYNNE A. GURLEY
PRIMARY PATENT EXAMINER
TC 2800, AU 2812

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the amendment filed 10/13/05.

Currently, claims 1-7 are pending.

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification, especially areas where the language and sentence structure appears to be the result of direct translation.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang (US 6,828,245, dated 12/7/04, filed 3/2/02 also US 2003/0166345) in view of Liu et al.(US 6,319,821, dated 11/20/01).

6. Chang shows the method as claimed in figures 2A-2F and corresponding text, as: forming a first interlayer insulating film 22A exposing a top portion of a lower metal line 22B on a semiconductor substrate (metal 22B in insulator on substrate); forming a stacked structure of a first etch barrier 24A, a second interlayer insulating film 26, a second etch barrier film 24B, and an anti-reflection film 26 (SiON DARC not shown; column 4, lines 40-52); etching the stacked structure to form a via contact hole 30 exposing a portion of the first etch barrier film on the lower metal line (fig. 2B; column 4, lines 64-67; column 5, lines 1-10); removing the exposed portion of the first etch barrier film to expose the lower metal line (fig. 2B); forming a

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photoresist film (34/28C in figs. 2D-2E. Note: the claim language does not preclude the resist formation step from being in two steps. Both the first step and the second step are subjected to an exposure and development process used to define the upper metal line. The first step covers the exposed lower metal line and defines the bottom of the upper metal line and the second step defines the upper part of the upper metal line. For a one step process, please see Lee et al. US 5,702,982, figs. 2-3) on the entire surface; subjecting the photoresist film to an exposure and development process using an upper metal line mask to form a photoresist film pattern for defining an upper metal line region, wherein the photoresist film pattern further fills a portion of the via contact hole (figs. 2D/2E); etching the anti-reflection film using the photoresist film pattern as a mask to form the upper metal line region (fig. 2F); removing the photoresist pattern (fig. 2F) and forming an upper metal line contacting the lower metal line by filling the upper metal line region (after fig. 2F). Fluorocarbons, and oxygen are disclosed as etchants for the dielectric layers (column 5, lines 1-10). The first and second etch barrier films are SiN or SiC films (column 4, lines 12-17 and lines 40-52). The second and third interlayer insulating films are low-k silica-base films, oxide films (column 4, lines 24-40).

Chang lacks anticipation only in not explicitly teaching that: 1) a third interlayer insulating film is present in the structure; 2) the anti-reflection film and the third interlayer insulating film are etched using the photoresist film pattern as a mask to form the upper metal line region; 3) the anti-reflection film and the third interlayer insulating film are etched with plasma using CF₄/O₂/Ar; and, the removal step for the photoresist in the via contact is performed in-situ.

Liu teaches, in a similar structure and process, using a photoresist to define a dual damascene contact (see figs. 7-11), that: 1) the process is applicable to a structure with a third interlayer insulating film; 2) the anti-reflection film 64 (a SiON layer appropriate for an ARC layer) and the third interlayer insulating film are etched using the photoresist film pattern as a mask to form the upper metal line region (figs. 8-9); and, a plasma etch with CF₄/O₂/Ar for the same dielectric layers (column 8, lines 1-32).

It would have been obvious to one of ordinary skill in the art to have had the structure shown in Chang include a third dielectric layer, as taught in the method of Liu, with the motivation that Liu shows that the, conventionally, the method is applicable to such a structure. In the same vein, it would have been obvious to one of ordinary skill in the art to have etched the anti-reflection film and the third interlayer insulating film be etched with plasma using CF₄/O₂/Ar, in the method of Chang as modified by the third dielectric layer in Liu, with the motivation that Liu teaches that these etchants are efficient with the same material dielectric layers.

It would have been obvious to one of ordinary skill in the art to have had the removal step for the photoresist in the via contact be performed in-situ, in the method of Chang, with the motivation being given by Liu, that plasma etch with CF₄/O₂/Ar etches the same insulating layers; and, with the motivation that an in-situ removal step is conventional, prevents intermediate contamination of the insulation layers and, improves the efficiency of the steps in the method.

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Response to Arguments

7. Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

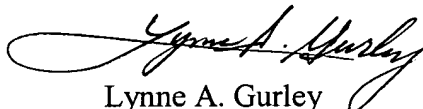
8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne A. Gurley whose telephone number is 571-272-1670. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Lynne A. Gurley
Primary Patent Examiner
TC 2800, Art Unit 2812